This is a presentation I delivered at the Urban Natural Areas Seminar at the University of Washington Center for Urban Horticulture in Seattle, January 30, 2019,

It was accompanied by a slide show that I will aim to get online in due time. I hope some enjoy this.

Growing Wild Plants

The Forest is Dying.
In fact, it is increasingly difficult to see the forest,
For all of the dying trees.
I stand among them,
Gaze up into them,
And ponder their fate.
A still familiar but somehow newly fragile
Icon of the Pacific Northwest.
Maybe someday they'll stand only as images,
The Cedars of the Pacific Northwest,
Like the Cedars of Lebanon.
The salmon of the Pacific Northwest,
Like the Salmon of the Thames.
The Forest is Dying.

The Forest is Alive.
This is the nature of the forest,
And the wetland, and the prairie, and any other wild ecosystem.
They transcend life
And death,
Even in death they cradle life.

If I look into the forest from one point of view,
I see the plants that did not survive
The summer's drought or the winter's storm.
On closer inspection,
The stubborn ones appear.
The Western Hemlock with just enough needles
To try again next year.
The ancient Red Huckleberry with only
A mantle of delicate green
Held high in the graying skeleton
Of a once vigorous giant.
It is easy to weep
For the death of the old world,
While waiting for the new world to arrive.

Longer observation reveals a lean in the trees.
Wind— like the generously brief episode the other night.
Some trees blow down in the wind,
Some have their crowns taken,
But many more simply lean away from the wind.
Sometimes gradually over time, and
Sometimes more abruptly.
And there they stand leaning
There is nothing new about this of course.
You can see the evidence of these events,
And even estimate when they occurred,
In the wiggles and wows of the trunks,
And the numerous leaders replacing
A singular broken tree top.

Some storms indelibly alter trees and stands of trees,
Across the entire region in a matter of hours.
Since arriving in Western Washington in 1993,
I have endured two of these memorable wind storms.
The wind we experienced the other night
Was just a taste of what those storms wrought.
The wind speeds were comparable,
But the short duration of the event
Mercifully limited the damage.
I spent that hour or so in a forest of trees
That are nearly a century old,
With an understory that is much older than that.
Mainly because of the way it was logged,
Not so mechanized,
Nor thoroughly disturbing as today,
And it was left on its own after that,
With the unmarketable timber still standing,
The Yew and Dogwood in their places.
Understory trees were likely damaged then,
And again countless times since.
They evolved to endure the abuse from above,
With little impact on their long term prospects.
Battering conditions of existence,
Only deepen their mysterious beauty.

My path through the forest that night
Sometimes fell on old railroad grade.
The ties and the tracks are long gone,

But the heavy gravel remains.
These folks devised and built elaborate networks of railroad
To get to those first trees, fell them, and haul them to Mud Bay.
They did it with steam engines, and mules.
And they lived in the woods they were harvesting.

I ask you to keep in mind this kind of human commitment.
They built a steam railroad through the Black Hills.
Not because it was easy,
But because it was the most efficient, reliable, and resilient way
To accomplish their goals.

At the height of the storm I was struck by the sensation
That I could feel our planet hurtling through the solar system.
The snapping and breaking and crashing of trees in the distance,
Warned of the next gust.
I braced myself,
But I feared for the trees.
As the ominous sound reached us
The grey trunks above,
Disappearing into the abyss of night,
First swung hard overhead,
Then bucked and whipped and yawed
Desperate to escape an invisible grip.
Lichen and moss and bits of tree
Flew through the air.
The sound of the wind
And the forest shattering in the onslaught,
The overpowering smell of pitch,

Punctuated by the toppling collapse of one great, old Douglas fir,
Marked me as indelibly as it marked the trees that early morning.

Soon after, conditions returned to normal,
But no question, we were changed by the wind,
The forest and me.

I am very fortunate to live among the trees,
To be a student of the forest.
I did not learn about the plants that I grow from books
Or in classrooms,
Or from sources of authority.
Instead I studied Philosophy.

Which brings me to the first in a series of Philosophical
Explications regarding Growing Wild Plants…

This one titled:

Experience, Authority, and The Crowd

So much of what gets done,
gets done a particular way
because that's the way it has always been done.
True
The first rule of any system is, *follow the rules*.
But
The second rule of a system *rooted in empiricism* is,
every rule can be improved.

There are benefits of integration, and cooperation through a network of people trying to succeed for a purpose, who can all agree that empiricism is the most honest and effective and therefore valid means to determine truth and find solutions to problems.
This, requires a willingness to concede that I may sometimes, not all the time but sometimes, not know what the hell I am doing, or just be plain wrong.

It is a challenge for all of us sometimes and some of us seemingly all the time.

Along these lines,
I think there are generally three legitimate sources of knowledge…

The Crowd is sometimes how we solve problems.
Some mighty big decisions are made by this method, for better or worse the leader of the free world is chosen this way.
But it is ultimately a house of straw. Muddled and muddied by bias and emotion and all sorts of human imperfection.

Maybe…
In the end,
We shouldn't google it after all.

From the muddle of the crowd we often turn to Authority for answers, and there are tomes and binders full of this canonical truth, but in the end it is only a house of sticks. Stubborn, ideological, and territorial, authorities are loath to adapt to new information at least not rapidly, and too often authority puts its own persistence ahead of the truth. So surprising as it may be, one should almost certainly question authority…

Who knew?

I think…

Experience, ultimately is the house of stone. Not just any old anecdotal reference, but experiential knowledge that is carefully scrutinized and understood within the context that it was discovered.
There is simply no substitute for this kind of experience. *Experience,* is after all the substance of empiricism, and empiricism is what separates us from the Republicans.

To be successful *growing wild plants* it is critical that we understand the forest, or the prairie, or the wetland, or the beach for the plants that are living and dying in them.

There is plenty of second hand knowledge about the forest,
But understanding is only found at the source.

Too often we are students in relation to books, or students in relation to our human teachers, only to behave as if we are the master when we engage with nature. We learn about nature in books or classrooms or God forbid on the internet, and then venture into nature to dictate our terms.

I think we have this all wrong. Integrating ourselves with nature means spending hours and days and weeks and months and years close to the ground, studying the materials and organisms of the earth. Looking for hints and inspiration on how to proceed.

Determining how to grow a wild plant or where it is best established is not an exercise in human will, but an exercise in human understanding, an understanding that grows out of a deep and abiding reverence for nature, and maybe even a bit of humility.

It is critically important for humans to finally accept that we simply do not know what is best.

How we proceed should be determined by an engagement with nature, and with less reliance on trusted authorities or even more whimsical ideas bandied about in the media, the industry, or conferences like this.

Approaching nature as a student and not as a master is critical to our reengagement with the world, and it is the first step to successfully growing wild plants.

As someone engaged in philosophy
I am concerned with language,
And I am concerned with maximizing its precision.

In the nursery, every item whether object or subject has a name.
The subjects with the power of speech of course name themselves.

In order for the nursery to function efficiently,
We all must agree to the meaning of these terms.
Each of the items has a protocol for proper use
And each has a well defined role to play
In one or more
Of the systems that have evolved in the nursery.

As someone engaged with nature,
I am concerned with the terminology
That is used to define and identify our relationship to nature.

The problem for example with the term Environmentalism.

Referring nature as the environment,
Indicates our long estrangement.
Nature is the source of our lives
And we are inextricably intertwined.
When we try to distinguish ourselves,
Whether by diminishing the value of nature
Or by elevating the value of our own comfort,
We are defying the clear truth

That our fates are the same.

Of course what I hear now
Is not so much talk of the environment,
But talk of Ecological Restoration.

I hear the phrase ecological restoration often.
It reminds me of another phrase,
something like: Make Ecology Great Again.

It is ultimately an appeal to authority.
It may be an attractive thought,
And in this case it may even be a valid aspiration,
But,
It has never been achievable,
And as we move into the future,
It will be patently impossible.

The world is changing too quickly for restoration.

If we are to survive this change at all,
We will reintegrate ourselves with our ecology,
And,
With one another.

This will not undermine the ideals of preservation and protection of the world as we found it.

In fact, protection of what exists of the wild world is likely our greatest concern.

I am a witness to the costly efforts in King County,
To undo the damage of an earlier boom in agriculture,
With the tax revenues of this latest one.
But the salmon still decline,
The Orca moan with hunger,
While the people lament and do nothing.

I am witness to the foolishness of the state,
As the oldest growth remaining in state forests
Is sold to fund schools.
At what cost to our children? I wonder.
Yew trees are only obstacles for machinery,
Lilies and orchids disappear beneath gravel roads.
Then rain and wind and landslides follow.
Streams change course and wetlands disappear.
It doesn't take long for the first canary reed to establish,
Probably delivered in the wheels of an ATV,
Recreating in the gravel of the stream.
I no longer wonder how these things happen,
because I have seen them happening first hand.

One day this spring,
I was walking out of the REI in Olympia.
There were two people
Who exited just ahead of me
And we all paused to don our sunglasses,

As they greeted the sun,
Blazing in a clear blue sky.
One, deeply pleased by the light and the warmth,
Joyfully and rhetorically asked the other,
“What did we do to deserve this?”
I wondered, and…
I was afraid I knew the answer.
It was one in a series of eighty degree days,
In May,
In Olympia, WA.
And the humans I encountered could not be more pleased.
I smiled helplessly and stepped off the curb,
Onto the hot black asphalt of the expansive parking lot.
The forests are dying.
The people, quite frankly,
Couldn’t care less.

Ultimately, the problem of ecological restoration
Is not a problem with plants, or weeds, or salmon.

The problem faced by ecological restoration is us.

More precisely,
What we value,
And what we fail to value.

As much as it is concerned with
Restoring particular plants or animals to a project site.
It should be concerned with
An attempt to heal our personal severance from nature.

This kind of ecological restoration becomes something different,
It becomes a kind of ecological integration. or reintegration,
As we reintroduce ourselves to the natural world,
and rediscover a reverence for it,
And aim to make the concerns of nature our own again.

It should not settle for building systems that prevent nature from harming us physically or financially.

But instead compel us to adapt our systems to nature,
And invite nature into the systems that we build.

There are many differences between the propagation of plants for the practice of ecological restoration and more traditional forms of horticulture and agriculture.

I refer to this type of plant propagation as simply, ‘Growing Wild Plants’.

I think we should distinguish here between the terms “native” and “wild” and beware the confusion, the overlap, and the differences.

A native plant may be wild, or it may be thoroughly tamed and cultivated, whereas a wild plant could be a relatively late arrival in an ecosystem where it has naturalized.

I suppose to be precise my endeavor has been to grow wild native plants, as opposed to cultivated native plants or non-native wild plants.

The circumstances under which a native plant may become cultivated are the steps in which characteristics of that plant are intentionally or unintentionally unnaturally selected for, so the potential of future natural selection is therefore presumed to be limited by this bottleneck of unnatural selection.

Traditionally, the purpose of plant propagation is to modify the plant through breeding and selection.

The goal is to produce a seed that easily germinates and grows into a consistent and predictable plant with particular desirable characteristics.

Or even ultimately forgo seeds all together after the characteristics are genetically settled, and propagate the plant vegetatively.

The propagator of wild native plants is guided by very different principles.

First among them is preserving the wild nature of the plant, and therefore preserving the future potential of that plant to evolve under changing and possibly extreme conditions.

It is under these extreme conditions that the broadest genetic pool will be needed to make possible the rapid adaptation of these ecosystems.

Propagation systems for wild native plants, guided by this principle must refrain from intentional selection, but also must work to eliminate the unintentional selection that occurs in many conventional and traditional systems of plant propagation.

There is in my estimation no deeper reservoir of information about climate and weather, and no more powerful resource for adaptation to change than the annually updated seed banks of the still wild or minimally disturbed wild lands of the earth.

The seeds of plants that have been carefully cultivated by the people for millennia are securely stored in a vault encased in ice to protect them from time and nature and the erratic behavior of their creators.

But little more than obscurity protects the most valuable treasures of this planet; wild seeds of wild plants stored for

decades or more just beneath the surface of what little wilderness remains.

These seeds are not metabolically still or static.

They are living and cycling through physiological dormancy, steadily approaching and then achieving release from it seasonally, before drifting back into dormancy if the conditions for germination and growth do not exist.

It is an incredible thing to realize and a fascinating community of hidden living things to ponder.

> Professionals in the ecological restoration industry
> Typically know something about plants.
> But often lack in-depth personal experience with them.
> For the most part they have a formal education in common,
> That has supplied them with a standard set of facts.
> In other words they often agree about what is best,
> But really haven't had any direct experience with it.
>
> Among growers in the native plant nursery industry,
> As with many other populations,
> There is a lot of folklore and even superstition and myth,
> Associated with plants and plant propagation.
> It is not at all unusual for them
> To have little or no academic training,
> But much more personal experience with plants.

In other words they rarely agree about what works best,
But have extensive experience succeeding at it
In their own particular way.

The experience is personal, site specific, and limited in scope,
Whereas academic knowledge is broader in scope,
But often vague and generalized and short on specifics.
Typically too, academics overlook the very real obstacles to the implementation of the solutions they devise, probably as a result of the assumption that what is true for one is true for all, that what works in one location or setting will work in others, and that characteristics are the same across what is really a variable spectrum.

A long familiarity with a native plant population in a particular region, based on years of interactions, is different than the ability to key out species, and determine their ecological role from a textbook.

The former is a relationship where the human has indeed been the student of the plant, devising and constructing propagation methods and infrastructure that are tailored to the characteristics of a population of plants, not a species of plants, and not all plants.

It is something to be marveled at,

But, there are flaws in these systems that have developed over time to become a serious concern.

The academic community, (for example Dr. Marianne Elliot the plant pathologist at WSU) is well aware of these problems but face stubborn obstacles to communicating the danger effectively, and devising solutions that will work for small propagators.

Many nurseries have sprung up in the back yards or on the back forty of self made rural folk who, not unlike organic farmers, found a way to do something difficult but rewarding, and managed to make a living without punching a clock.

It is not unusual for them to be suspicious of authorities and regulators, and it is difficult for regulators and academic authorities to devise systems that effectively and economically solve the very real problems that exist in these nurseries.

It is of paramount importance that we recognize the flaws in our own systems, because they are often what energize opposition to our ideas.

It will do no good to conceal them or insist that our good intentions render them irrelevant.

To win the endorsement of those who are not natural allies, we must transparently examine our own errors and imperfections with the purpose of resolving them and perfecting our systems.

Practices that are widely accepted and employed throughout the native plant nursery and ecological restoration industries pose a significant threat to wild ecosystems with consequences that could eclipse any good that we do.

Further, there is a tendency to maintain low expectations about just what is possible and what should be expected.

In the nursery at Sound Native Plants,
We have worked diligently over the last few years to understand the problems of the industry and assess them honestly at their most basic level.

There are some particular issues that I will discuss in detail a bit later, but first, in an effort to communicate just how it is that we design evolving systems in the nursery operation at Sound Native Plants, please indulge me while I embark on another philosophical explication.

The secret is, there is no secret.
There is no special gift or patented invention
Necessary to solve problems.
There is no silver bullet or magical elixir.

There is no mechanized god to step in.
In the end it is up to us.
Coming to terms with this is a critical first step,
And a terrifying one at that.
As humans appear to be gearing up
To either wipe themselves out,
Or spend the rest of their existence
Lamenting and regretting what was lost.
We cannot let this stop us,
Only we can fix it.

The secret is, never give up.

Hard work and dedication
Are what it takes to solve problems.
The dedication to solving a problem,
And the willingness to innovate,
Even when that means running afoul of the powers that be, Are what it takes to succeed.
The best way to get permission to do something
Is in fact to succeed at it.
Don't let obstacles,
Real or imagined,
Stand in your way.

The secret is, before you do something a second time, first do it perfectly once.

This is the purpose of a system.

Standardize the process,
Or randomize the results.

Perfection is out of reach,
Always strive for perfection.

With each new execution,
Subtle improvements to the system
Are introduced tested and then either abandoned or
Incorporated into the rules.

The development of the system
Comes by diligent attention
To the results
Every time you re-execute,
And the subtle modifications you make to the system
As you repeat the central task,

Calibrating your movements
To maximize efficiency.

In time, there is a toolbox of variations
That can be applied to special circumstances.

Typically, a new system
Will rapidly evolve
As we put it to the test.

With well established systems
It is rare that we find any need for modification,
But we are quick to marvel at the elegance
Of the subtlest new improvement.

The human elements of our systems
Fall into one of two classifications.
At the center of the operation is the AI.
This individual is solely occupied with the central task,
Never to be troubled by a distraction
Because the task to be repeated thousands of times
Is so critical to the success of our mission
That any errors are consequential errors.
At the service of this central organ is a facilitator.
The facilitator will maintain supply lines of prepared materials,
And enable the steady flow of produce
Away from the center of the operation.

The facilitator must maintain a view of the big picture at all times,
So the AI can be thoroughly consumed by the central task.

Interestingly, the AI is usually the junior member of the group.
The AI is initially rigorously trained to perform the central task
With faithfulness to each and every step of the system.
However, in time, it is almost certainly the AI
Who discovers a novel improvement
To an existing rule.

This simple arrangement,
Enables us to complete many different operations
With increasing speed and efficiency
Without compromising the quality of the product.
The imperative is to work slowly and intentionally

With a laser focus on perfecting the steps of the system.
Speed ultimately comes as a consequence of mastery,
Not haste.

For each of the operations in the nursery, a dedicated work station has evolved, so that in limited space with relatively primitive equipment and infrastructure, three people can quite easily produce, package, and ship a few hundred thousand plants in a season.

More importantly, it can be confidently concluded that these plants have not become a vector for exotic soil organisms. Or more accurately, have not become a vector for soil organisms that do not exist at the installation site, whether they are known pathogens or not.

New species can easily be introduced into this system with little or no modification beyond seasonal timing and personal calibration,

And,
Production of a particular species can be scaled up with ease.

It is quite easy to produce a single specimen of a given plant, even a wild one. But the real challenge comes with producing tens of thousands of that plant, from wild seed, on a deadline, so that each one meets the specifications of the order and is ready to be shipped on a particular date, often a couple of years into the future. This is what a system like this enables.

It is categorically imperative that native plant nurseries do not harm the ecosystems they exist to enhance.

I am here to tell you that the future will not be found in a gallon pot, which is the most common container specified in the ecological restoration industry.

A plastic one gallon pot
Is essentially a single use container.
It quickly becomes garbage, and
Is the worst kind of garbage.
Our industry can make no claim to improving the world
While continuing to use
Inefficient and destructive practices
To achieve our goals.

Pots are a disease vector and reusing them only increases this propensity.
I would advise that you not buy native plants in reused one gallon containers, unless the sanitizing method employed can be thoroughly investigated.

They are waste that cannot be recycled.
It is difficult enough to get clean plastics recycled.
There is no existing recycling stream for nursery containers.

They are expensive to clean or to purchase.

It costs just as much to properly clean and sanitize a used container as it does to buy a new one.

They are inconvenient to handle and to ship, and the way in which they are stacked in trucks serves to increase the likelihood they will be a vector for exotic organisms.

They consume more fuel to transport than the alternatives available to the industry.

They are more difficult and disruptive to install.
Transporting them around the installation site is disruptive,
Digging large holes to plant them disrupts the project site and increases the likelihood that weed seeds will be brought to the surface where they can germinate and grow.

Responsible parties must establish that nurseries are not spreading exotic organisms into these project areas.

Whether it is something as large as a weed seed,
Or as small as a *Phytophthora* oospore,
The risk of doing great harm clearly exists.

The alternative we focus on is the 5.5 cubic inch and 10 cubic inch cone or tube.

The cones are suspended in racks, not elevated.

If handled properly, the plant never comes into contact with the ground before it reaches the project site.

The racks and cones, or tubes, never leave the nursery. Therefore, although they are being constantly reused, they cannot become a vector for exotic organisms returning to the nursery operation.

All plants grown this way are removed from the tubes in a highly controlled and efficient system, that acts as a final layer of quality control, ensuring that every plant shipped meets the established standard.

The racks and tubes are then washed and sanitized in two discrete steps, ensuring that we are beginning each new round of propagation with containers that are free of even the smallest organisms.

We can rapidly load and ship tens of thousands of plants for delivery with out further risk of contamination, and consume less diesel to deliver more plants to project sites.

The bundles of plants can be moved around the project site much more easily and efficiently, and the planting is conducted with a dibble and not a shovel, making site disturbance far less significant.

Even if a greater number of plants need to be specified to make up for the smaller size or possible losses, the tube is

still the economical choice, since more than three tubes can be purchased for the cost of a single gallon.

The depth of the tube is just a bit greater than the gallon, and the roots of the plants grown in tubes are oriented down, ready to initiate growth in the most advantageous direction.
Where as the roots in a gallon pot are encouraged to begin circular growth, the least advantageous arrangement possible.

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Plants are Not Objects - Plants are Subjects

Plants and trees commit their lives to defend a particular space, be slow to consider your plans to displace them.

We have grown accustomed in the modern world to convenience and the immediate availability
of whatever it is we desire.

But plants are not books on a shelf,
Or bricks on a pallet.

Plants in containers, not unlike human children are perishable, vulnerable, and in need of constant care and attention.

> When and how they are treated will be a determining factor in project success.

There may be no better way to understand the subjective nature of plants than to consider physiological seed dormancy.

Seed dormancy is controlled by both genetic and environmental factors.

Different genotypes within a species will exhibit different degrees of dormancy.

The same genotype may exhibit different degrees of dormancy based on the environmental conditions in which the seed developed.

So, genotypical, phenotypical, and individual variation can be expected.

The physiological dormancy develops in the seed itself, and is not directed by the parent plant.

Seeds exhibit continuous (non-discrete) phenotypic variation in physiological dormancy.

Seed from the same mother in the same season can exhibit a variety in the type and depth of dormancy depending on what part of the plant or even what part of the flower the seed developed on.

Propagation protocols for species are therefore not highly reliable.

Propagation protocols that work for a given seed lot of a given species at a certain location should not be presumed to work for future seed lots of the same species until tested.

A protocol that works for a given seed lot that is fresh, may not work for the same seed lot after storage.

I would warn that seed embryos can easily be damaged by elaborate attempts to release dormancy, and the harm is often in excess of the benefit.

Also, I think it could be argued that this is one of many things that is actually de-wilding the native plant.

If an elaborate propagation protocol improves germination results from 30% to 75%, an alternative might be, forgo or limit the seed treatments, and simply increase the number of seeds in a tube. Then the ungerminated dormant seed can travel with the growing plant out into the project area still dormant, contributing to the existing seed bank at the site, and providing a bit of an insurance policy if the first plant should suffer a setback or die before it establishes itself.

Consider that if you are buying bare root plants, you are only getting plants from seeds that willingly germinated under the

conditions provided at the nursery. This is a layer of unnatural selection and a sort of de-wilding.

The tubes that we ship always contain a well developed living plant. But, in almost every case they also include multiple dormant seeds nestled at the base of the plant, which remain viable and ready to emerge in the future at the restoration site.

It is better to build systems that let wild seeds germinate in good time, protected from disturbance until the plant has emerged.

As far as structures and infrastructure, primitive is always best. The less elaborate the system, the less costly it is to maintain and the less vulnerable it is to disturbance. You do not need electricity or artificial heat to grow native plants, you do not even need cement. But you do need structures that can be walked away from for a few hours a day at least, returning to find everything still in order.

Structures must eliminate variables, like wind and rain and birds and most importantly mice. If you do not eliminate these variables then you can really never determine what is wrong when you fail, nor what is right when you succeed. The lowly mouse has posed from the earliest years of my experience growing these plants to this very day, the greatest threat to my success.

You cannot determine why a seed has not germinated, if it has been removed from the tube by a mouse or a bird. Structures must exclude these creatures, or nothing else is really possible.

By building these primitive, minimalist systems, we pave the way for what may be a most revolutionary advancement.

As with many human systems, the ecological restoration industry has employed a core and periphery approach, or hub and spoke as I like to call it. This design creates indispensable resources at the center of an operation, and places all of the projects or investments at the end of spokes around the periphery.

All roads ultimately lead through the hub, creating a system wide risk that a catastrophic collapse can effect all of the projects at once. The hub becomes a potential source of contamination for the spokes it serves. Organisms common in one area, travel through this type of system and ultimately contaminate all of it.

A native plant nursery is a perfect example of a hub. Imagine used containers and tools traveling from the hub, out the spokes to the project sites, and then returning to the nursery for reuse. The entire system becomes a vector for contamination with exotic organisms, whether they be weeds or water molds.

If instead we build primitive systems that can exist in situ, constructed at the site of major restoration work, they could ultimately serve smaller nearby projects. If this work was completed and the nursery rendered obsolete, the operation

could be rolled up, and the footprint planted. Corridors could be constructed between these nodes, so that the hub and spoke system is replaced by a node and corridor system. Something resembling that railroad I asked you to imagine earlier. Not muscling through the terrain to devour the forest, but muscling through that same terrain to assist in the enhancement and management of it. Maybe in time we build our own railroad, to burrow deep into the wilderness, adapting and learning along the way, mitigating fire threats and reducing the number and type of invasive weeds, while increasing the numbers and variety of native plants.

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All plants are not propagated equally.

> Whether a plant is propagated by seed or from cutting has significant impact on the performance of the plant in the near term, and the diversity of the planting in the long term.
>
> Depending on what the overriding objective is, either or both of these methods may be preferable.
>
> One should always inquire about the provenance of a plant,
> and one should also inquire about the propagation method, age of the plant, and timing of the propagation.

A plant propagated vegetatively, will wake up in spring and immediately begin to vigorously project that vegetative phase into its growth habit.

A plant propagated from seed will wake up in spring as a juvenile, projecting the more delicate growth of this much earlier phase. It will also be genetically distinct from its bundle mate.

Maybe a mix of these methods is the best choice for most restoration projects.

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In closing I would like to point out
That there is always a new way to fail,
And doing everything we know how to do correctly
Will not save us from making a new and different mistake,
Or the consequences of an uncontrolled
Or uncontrollable variable.

But, cooperation, flexibility, and a commitment to refine our systems with each new round of production,
will improve our chances of success,
and also allow us to enjoy the work we do more thoroughly.

I ask you to,

> Train your expectations to accept the terms and conditions of nature.

———

Finally, I will leave you where I began,
In the forest of dying trees.
It is comforting to remember that these forests
Rarely exist at their evolved density or distribution,
Especially when it comes to the commercial trees in the stand.
In almost every case they have been planted by human hands.
This density comes at the expense of the forest,
And also as a result of the generous rain
And moderate temperatures
We have grown to expect.
Now the overstock of commercial trees
Is having severe consequences for all the forest plants.
There are just too many trees out there,
And many of them are dying,
Great and small alike.

Since 2015, the part of western Washington that I spend most of my time in has suffered deep, seasonal droughts that have killed many mature plants, and tested others to their limits.

As these old individuals lose their lives, the juvenile and adolescent individuals of those same species continue to thrive around them.

One species may find an advantage in the mix, but what is clear to me is that the young, up and coming individuals of these same species seeing significant losses of mature plants are vigorous, well distributed, and rapidly adapting to the new conditions.

This is not necessarily a genetic adaption, but is more likely a result of the experience these particular plants are having in the early years of their lives.

Drier conditions during long summer droughts discouraging unsupportable top growth while encouraging deeper rooting resulting in stronger drought resistance.

The character of these plants is changing with the weather.

Plants have expectations that are tailored to experience.

Plants are not objects, they are subjects.

I have concluded that a successful life begins with a drive to be indispensable.

It is something we are compelled to do by the nature of evolution.

But there is more than one impulse, and in time I think that drive transforms, from a desire to be indispensable to a desire to become superfluous.

To secure and return all we have gained during the part of our lives when we were driven to outperform others.

I see this in the great, old Western Red Cedar trees who have been nearly undone by the drought and heat of the last few years.

It is not the species that is on the ropes, but those individual trees that are pushed to the brink.

The newcomers will grow and thrive in appropriate places, but those grand old trees are living out the final stage of their lives.

The foliage is sparse and red or brown because the trees are devoting their energy to producing seed, at the expense of the tree.

That is what living looks like in two thousand and nineteen.

They are thinking less of themselves, and thinking more of the future, and those little red cedar to come.

Maybe, we can learn something from them, and from the forest, about how to live our one wild and precious life.

This poem appeared on the final slide of the original presentation, the words of the poem were not spoken.

The Summer Day —Mary Oliver

September 10, 1935 - January 17, 2019 (aged 83)

Who made the world?
Who made the swan, and the black bear?
Who made the grasshopper?
This grasshopper, I mean-
the one who has flung herself out of the grass,
the one who is eating sugar out of my hand,
who is moving her jaws back and forth instead of up and down-
who is gazing around with her enormous and complicated eyes.
Now she lifts her pale forearms and thoroughly washes her face.
Now she snaps her wings open, and floats away.
I don't know exactly what a prayer is.
I do know how to pay attention, how to fall down
into the grass, how to kneel down in the grass,
how to be idle and blessed, how to stroll through the fields,
which is what I have been doing all day.
Tell me, what else should I have done?
Doesn't everything die at last, and too soon?
Tell me, what is it you plan to do
with your one wild and precious life?

I believe the wind storm I mentioned happened on the morning of January 6, 2019. Mary Oliver passed away on the 17th, news reports followed the next day. The ideas in this presentation have been with me for varying degrees of time, some for decades, but the inspiration for this piece came between those dates. I spent the time between the news reports of Mary Oliver's death and the 30th winnowing it down to this version.

This is exactly the script I read from, which explains the formatting.